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ABSTRACT

This study investigated the way in which parental beliefs moderate affective reactions to children at risk for abuse. A sample of 40 unrelated mothers was drawn from a larger research project. At-risk and not-at-risk children were recruited from 40 families participating in counseling at a local child abuse agency. At-risk status was determined through: (1) difficulty ratings reported by mothers; and (2) amount and severity of discipline received, as measured by Straus, Gelles, and Steinmetz's (1980) Conflicts Tactics Scale. The Parental Attribution Test was used to assess parental beliefs concerning causes of caregiving outcomes. Unrelated mothers were asked to interact with children from the families receiving counseling for child abuse. Each mother interacted with two siblings, one of whom was rated as being at greater risk for child abuse. Matched speech segments from the interactions between mother and child were acoustically analyzed in terms of the speaker's fundamental frequency, pitch perturbation, and acoustic quality. Analysis revealed that speech from "powerless" mothers was characterized by significantly more stress, especially when the message was directed to children at relatively greater risk for abuse. It is argued that differences in the mother's speech quality are signs of perceived stress and will ultimately contribute to ineffective communication patterns. (RH)

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Caregiver beliefs and acoustical signs of stress in speech

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Poster presented at the Annual Meeting of the Western Psychological Association, April 26-29, 1990

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Running Head: Caregiver beliefs and prosodic quality

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Abstract

Parental attributions play an important role in the interpretation of child behaviors and in the affective quality of subsequent messages. It is argued that mothers possessing a "powerless" attributional style (low power to self and/or high power to others) perceive interactions with children at risk for abuse as more stressful, and that this stress should be detectable in their speech. Unrelated mothers were asked to interact with children from families receiving counseling for child abuse. Each mother interacted with two siblings, one of whom was rated as being at greater risk for child abuse. Matched speech segments from the mother/child interactions were acoustically analyzed in terms of the speaker's fundamental frequency, pitch perturbation and acoustic quality. The analysis revealed that speech from "powerless" mothers was characterized by significantly more stress, especially when the message was directed to children at relatively greater risk for abuse. It is argued that the differences in the mother's speech quality are not only signs of perceived stress but ultimately will contribute to ineffective communication patterns.

Caregiver beliefs and acoustical signs of stress in speech

Recent investigations of parent-child interactions have recognized that both participants help to shape and direct the exchange. The reciprocal nature of the interaction yields not only a more dynamic view of the parent-child relationship, but also has profound implications for the study of socialization. Attributes of both participants feed into the process and work to jointly determine the outcome of the caregiving relationship.

During the past few years, greater attention has also been paid to the role of parental beliefs in child development. Beliefs have profound influence over a parent's interpretation in the cognitive (Miller, 1988) and social domain (Goodnow, 1988). Within interactions, attributions act to moderate both behavioral and affective responses of the participants (Bugental, Blue, & Lewis, in press). A parent's reaction to any given behavior will, in large part, depend on their understanding of the situation and the child.

The present study investigates how parental beliefs moderate affective reactions to children at risk for

abuse. Interchanges between an adult and a child within a caregiving system are a product of the behaviors and thought processes of both of the participants. The majority of past psychological research concerned with child abuse focussed on the role of the abusing parent. While this research has been profitable, it yields a one-dimensional picture of the dynamics within the abusive family. In the past two decades, attention has moved towards models of socialization that include not only the parent's psychological characteristics but also the effects of the child on the adult and the caregiving system as a whole. Abused children are more likely to have characteristics that place increased strain on caregivers. They have been found to have a higher incidence of physical problems and learning disabilities (de Lissovoy, 1979), prematurity (Elmer & Gregg, 1967), medical problems (Sherrod, O'Connor, Vietze, & Altemeier, 1984), lower levels of empathy and social skills (Camras, Grow, & Ribordy, 1983), and to be socially unresponsive (Oldershaw, Waters, & Hall, 1986). While many of these studies involve retrospective reports, others factors (such as medical problems) were observed to precede incidents of abuse. These

characteristics by themselves do not, however, mean that abuse will necessarily follow. Instead, these characteristics can be conceptualized as additional sources of stress on the caregiving system. Given that attributes of abusive parents may make them more reactive to stressors in the environment (Wolfe, 1985), the added strain from the child increases the likelihood of future abuse.

Bugental and her colleagues (Bugental & Shennum, 1984; Bugental, Mantyla, & Lewis, 1989) argue that parental beliefs will moderate their reaction to child behavior during an interaction. Bugental and Shennum (1984) propose a transactional model of adult-child interaction where the attributions of the adult act to make them more or less reactive to the child's behaviors. In particular, adults who attribute low personal control and high control to the child over interactional failures should react negatively to problem behaviors. In support of this hypothesis, low-powered adults illustrated higher levels of negative affect and weaker nonverbal messages when they interacted with unresponsive children (Bugental & Shennum, 1984). In addition, this helpless

communication style maintained the unresponsive behavior and could be seen as contributing to the long-term disruption of a caregiving system.

Subsequent research supports the argument that the affective pattern of the adult's messages are a function of both the adult's attributions and their response to the child's characteristics. Bugental et al. (in press) observed mothers interacting with children from families seeking counseling for child abuse. They reported that mothers with a helpless attributional style directed more negative and fewer positive nonverbal messages towards children at risk for abuse than towards their relatively low risk siblings.

Adults with this helpless attributional style also experience more stress when they are confronted with difficult child behaviors. Bugental et al. (1989) found that the speech of powerless mothers sounded more stressful when it was addressed towards difficult children. In a related finding, mothers with the helpless attributional style also show physiological signs of stress when preparing to interact with a difficult child (Bugental & Cortez, 1988).

Bugental's research has utilized many measures of

stress and nonverbal affect. To assess the emotional quality of speech samples, a segment would be played through a band-pass filter while raters would record their impressions. This method is an effective means of quantifying the messages, yet it is unclear what in the speech segment is tied to the rater's negative or positive impression. A more specific measurement can be obtained from acoustic analysis of the speech samples. Messages digitally stored for processing by a computer yield exact measures of a variety of acoustic parameters that are related to emotional expression. In his review of prosodic research, Scherer (1986) outlines the connection between several acoustical features and various emotional dimensions. In particular, the speaker's Fundamental frequency (F_o, defined as the characteristic frequency of speech), its mean, range, and variance, are reliably related to nonverbal emotional expression in speech and are especially useful as an assessment of stress. Stress can also be measured by the overall acoustical quality of the message in terms of the distribution of energy across the frequency range. Upward changes in both the level and variability of the fundamental frequency have been associated with

higher levels of stress (Williams & Stevens, 1972), while overall speech quality should deteriorate as stress increases (Laver, 1980).

The present study extends the use of acoustical analysis to a natural interaction between an adult and a child. Mothers were recruited from the community and asked to talk with two children from a family seeking counseling for child abuse. Of the two children, one was identified as being at relatively greater risk for abuse. Bugental et al. (in press) demonstrated that the emotional experience of the adults will vary as a function of their own beliefs and the child's behaviors. Speech samples from these interactions should also yield acoustical evidence of change in emotional experience. Past research has employed an actor's expression of a specific emotion or the analysis of one speaker during a clearly identified emotional episode (Williams & Stevens, 1972; Streeter, MacDonald, Apple, Krause, & Galotti, 1983). These studies have helped to clarify the important parameters for measurement, but because of their lack of generalizability it was unclear how they relate to natural emotional expression. The adult-child interactions used here were unstructured, and are not

significantly different from dialogue that would occur naturally in a caregiving environment. Speech segments matched in terms of content will be taken from each dyad, and differences associated with attributions and child behaviors can then be discovered.

It is predicted that mothers with a helpless attributional style (those who believe that they have little control over failure or who believe that the child has high control over failure) will perceive the interaction with children at higher risk for abuse as more stressful. This stress should then be associated with changes in the acoustical properties of their voice. Specifically, when comparing speech samples from an interaction with a child at risk for abuse to a child who is at relatively less risk, the adult's speech to the at-risk child should be characterized by higher mean F_o levels, higher F_o range and variablity, and lower overall voice quality.

Method

The primary aim of this study was to test the association between causal attributions for caregiving failure and affect communicated vocally to at-risk versus relatively not-at-risk children.

Subjects

Mothers. The sample of unrelated mothers were drawn from a larger research project investigating the communication of affect within families at risk for abuse (Bugental, et al., in press). This group consisted of 40 women recruited from the community through advertisements in the local newspaper and notices placed in laundry-rooms of the university housing complex. All of the mothers had at least one child between the age of 3 and 13 years old, and 27 of the 40 mothers were married. Their mean age was 39.03 years (SD = 7.11), their mean education level was 15.43 years (SD = 1.95), and all spoke English as their first language.

Children. The at-risk and not-at-risk children were recruited from 40 families who participated in counseling at a local child abuse agency. Each family had at least two children between the ages of 3 and 13 years (mean number of children in each family was 2.7, SD = .9). When families had more than two children, those selected were matched as closely as possible for age and, when possible, also matched in terms of gender. At-risk status was determined through (a) difficulty

ratings reported by the mothers and (b) amount and severity of discipline received, as measured by the Conflicts Tactics scale (Straus, Gelles, & Steinmetz, 1980). At-risk children (those rated as more difficult and relatively higher on the Conflict Tactics scale) had a mean age of 8.6 years while not-at-risk children had a mean age of 7.4 years.

Measures

Parental Attribution Test. The Parental Attribution Test (PAT) is a device designed by Bugental to assess parental beliefs concerning the causes of caregiving outcomes (Bugental et al., 1989; Bugental & Shennum, 1984). Respondents are asked to rate the relative importance of potential causes of successful and unsuccessful adult-child interactions. These ratings yield scores along two major dimensions within both the success and failure domain: controllability of outcomes and locus of control (Bugental, Blue, & Cruzcosa, 1990). Four subscales are created through the combination of these two dimensions; attributed control to adults for success (ACS), attributed control to adults for failure (ACF), attributed control to children for success (CCS), and attributed control to children for failure (CCF).

Bugental et al. (in press) found that failure attributions are significantly associated with differences in parental affective responses, and scores on the ACF and CCF scales also distinguish between abusive and non-abusive parents (Bugental et al., 1989).

In the present study, predictions are made for the parental attributions for control over failure experiences. High ACF scores can be interpreted as a sign of the belief that caregiving problems are due to aspects of the self and the environment that are controllable or that could be changed by the adult. Low ACF scores reflect a belief that caregiving problems are due to causes that are beyond the control of the adult. High CCF scores indicate the extent that negative caregiving events are believed to be due to causes that the child "should" be able to control, while low scores reflect a belief that problems are due to things that are less controllable by the child. A full description of the device, scales, and scoring procedure can be found in Bugental et al. (1990).

Acoustic Measures. In the present study, measures of the subject's Fundamental frequency and overall voice quality will be used to quantify prosodic quality.

Fundamental frequency (F_o), an acoustic measure that corresponds to the percept of pitch, is the most widely used measure of prosodic quality. Past research has found an association between emotional experience and changes in mean F_o level, range, and variability (e.g., Williams & Stevens, 1972). In addition, Scherer (1986) notes that indices related to the spectral energy distribution in the speech samples might be related to prosodic quality. Frokjaer-Jensen and Prytz (1976) suggest that such a quality measure can be calculated by forming a ratio between the total spectral energy (in dB) found in the 0-1000 Hz frequency range and the energy found above 1000 Hz. This ratio should be related to perceived voice quality, and according to Laver (1980) would also be sensitive to changes in emotional experience.

Procedure

The mothers who volunteered were told that they would first interact and then play a game individually with two children at the offices of the child abuse agency. Before they met the children, they filled out the PAT and answered other background questions. The interactions occurred in a comfortably furnished waiting

room constructed for audio and video recording. The room contained two chairs, tables, and lamps, but no toys or books that would distract the participants. The chairs were placed a few feet apart and at an angle facing each other. Microphones were fixed in the ceiling above the chairs and hidden in a plant on a table between the chairs.

As the recording began, the first child would enter the room accompanied by the experimenter (the order of the children was determined by a coin flip). After taking their seats, the mother and child were instructed to "talk to each other" while the experimenter went to set up the game that they would later play. These unstructured interviews lasted for four minutes, followed by the return of the experimenter with the game (a puzzle task). The game was set out on a table, and the experimenter left to let the mother and child work together. After an additional eight minutes had passed, the experimenter returned, collected the game, escorted the first child out, and then returned with the second child. The steps of the first interaction were then repeated with the mother and the second child (see Bugental et al., 1989, for a complete description of the

sequence in the larger study).

After the recording was complete, the unstructured conversations were replayed and all occurrences of the target speech segment (sentence initial occurrences of "Do you") occurring after the initial two minutes of dialogue were identified. Only subjects who had said the target segment to both children were used for the analysis, and 20 out of the 40 mothers said "Do you" at least one time to each child. These target messages were then digitally stored on a Dell 286-12 personal computer. The digitized samples were analyzed using the Interactive Laboratory Software speech analysis system (Signal Technologies Inc., 1986). This program uses a linear predictive coding analysis scheme to extract measures of a variety of acoustic parameters from a speech sample. After the analysis was complete, the mean fundamental frequency (F_o) level, F_o range, F_o variability, and voice quality index for each subject were available for comparison.

Results

Mixed-model, multivariate analyses of variance were used to compare the effects of adult attributions and child at-risk status on speech quality. The predictions

for the effects of the two between-subject variables (ACF and CCF attributional groupings) and one repeated measure (child risk classification) were assessed for each acoustic variable. In terms of the overall mean F_o level, a significant interaction was found between CCF and child at-risk status ($\underline{F}_{(1,16)} = 6.10$, $\underline{p} = .025$). As shown in figure 1, the mean F_o level of low CCF mothers did not differ significantly as a function of at-risk status, while the mean level for high CCF mothers did differ between the children. F_o levels were significantly lower when they spoke to the not-at-risk child.

Insert Figure 1 about here

A significant main effect for CCF classification was obtained for F_o range as adults with high child control beliefs demonstrated a wider frequency range in their F_o values than those adults who believed that the child had little control over interaction failures ($\underline{F}_{(1,16)} = 5.08$, $\underline{p} = .039$; see figure 2).

Insert Figure 2 about here

A significant main effect for at-risk status was also obtained for the energy ratio measure of overall voice quality. Speech spoken to the not-at-risk child was characterized by significantly better quality ($F_{(1,16)}$ = 5.04, p = .039; see figure 3). This finding should be

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Insert Figure 3 about here

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qualified by the presence of an interactive trend that showed that the effects differed somewhat between ACF groupings ($F_{(1,16)}$ = 2.58, p = .128). As shown in figure 4, mothers with low self-power attributions had poorer quality speech during their interaction with the at-risk child, while high ACF mothers did not show a difference.

Insert Figure 4 about here

There were no other significant differences observed for the other factor combinations.

Discussion

The pattern of acoustical findings demonstrates that the adult's attributional style moderated their reaction to the behavior of the children and to the situation in general. Adults with a helpless attributional style (low control to self and/or high control to the child over failures) showed significantly more stress in their voice and this effect was more pronounced when they interacted with the at-risk child.

These findings support Bugental's transactional model of caregiving interactions (Bugental & Shennum, 1984; Bugental et al. 1989). Adult and child characteristics interact and the role of any one variable must be assessed in the context of other important factors within the caregiving system. The parent's belief system acts to influence their interpretation of the environment, and these beliefs can subsequently amplify or attenuate the effects of the child's actions. Within an abusive family, the negative emotional reaction of the adult could conceivably combine with the helpless quality of their messages to maintain the problem behavior of the child. This communication pattern locks the dyad into a troubled

interaction pattern, and the continued problems could then lead to abusive behavior on the part of the caregiver.

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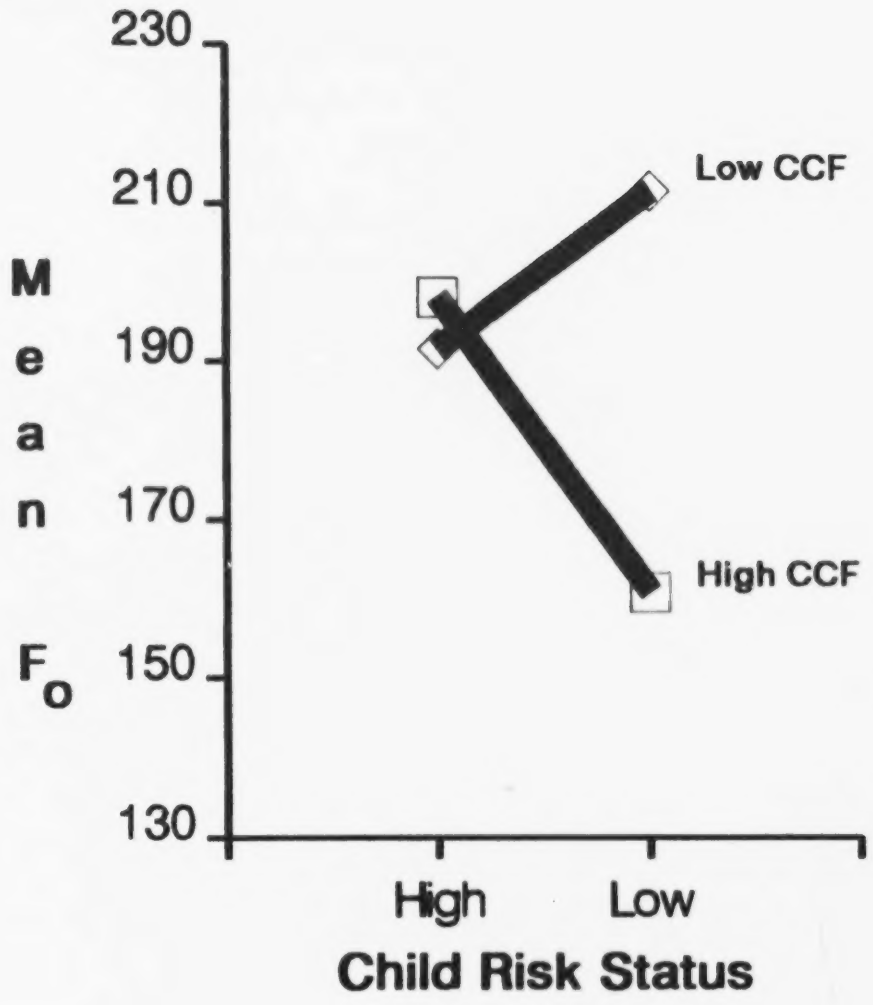
Figure Captions

Figure 1. Mean Fundamental Frequency as a function of CCF beliefs and child risk status.

Figure 2. Fundamental Frequency range as a function of CCF beliefs.

Figure 3. Energy ratio as a function of child risk status.

Figure 4. Energy ratio as a function of ACF beliefs and child risk status.


230
210
190
170
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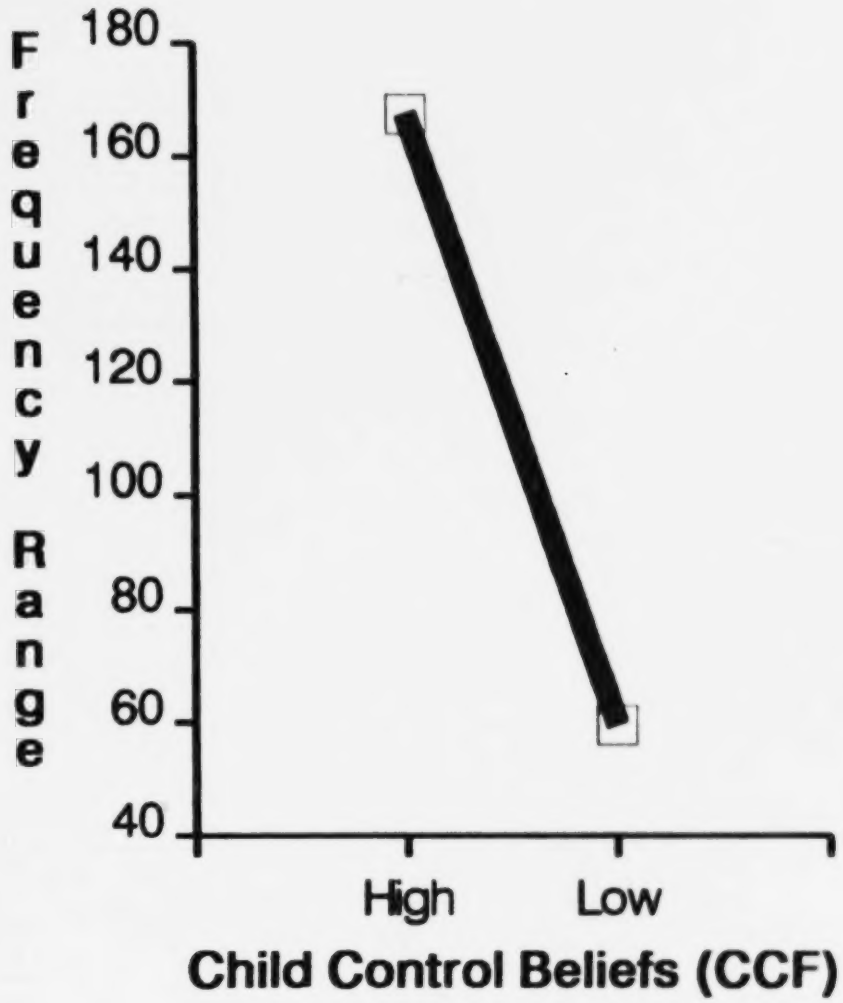
130
Mean Fo
Low CCF
High CCF
High
Low
Child Risk Status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140
120
100
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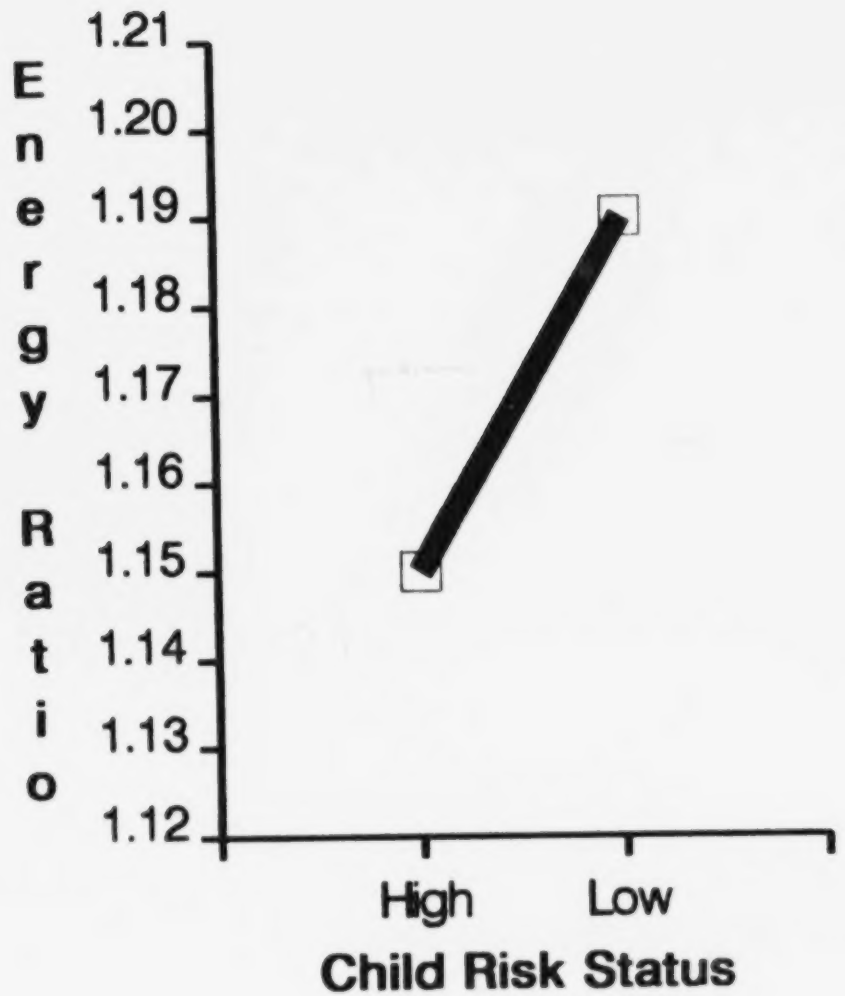
60
40
High
Low
Child Control Beliefs (CCF)


Energy Ratio
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1.16
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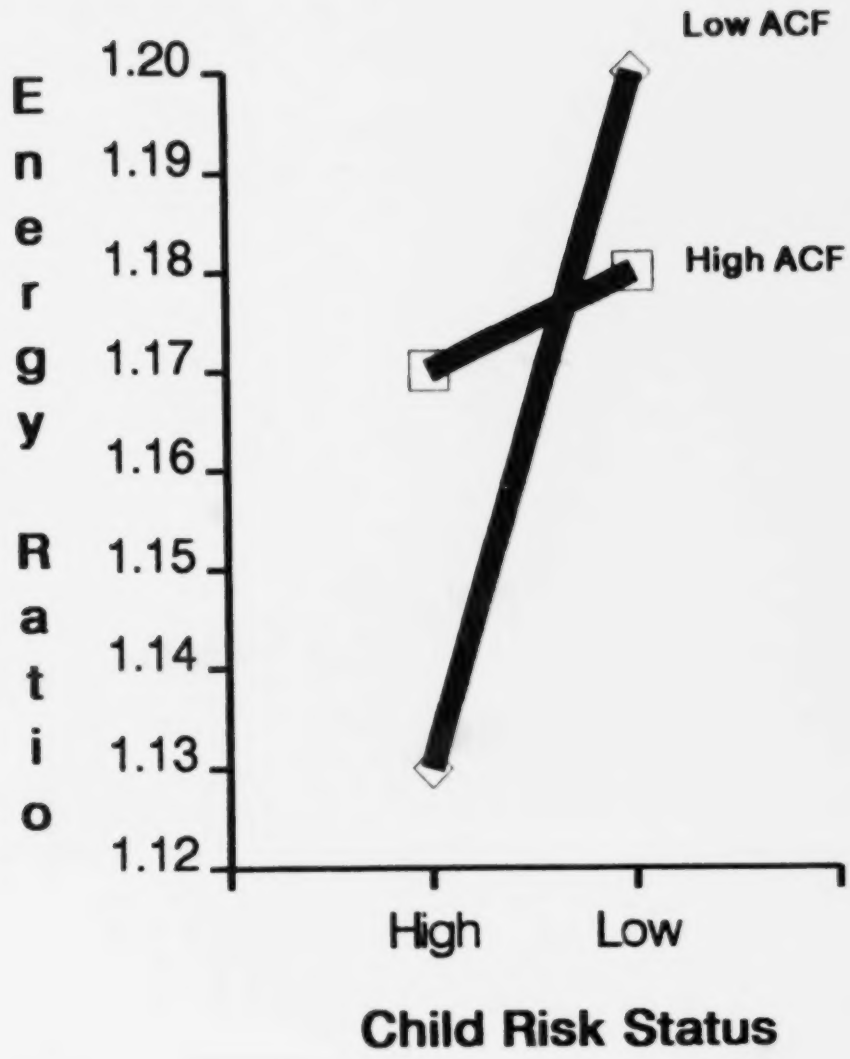
1.14
1.13
1.12
High
Low
Child Risk Status


Low ACF
High ACF
Energy Ratio
1.20
1.19
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1.17
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High
Low
Child Risk Status